

1 What is claimed is:

2 1. A viable GGTA1 null swine.

1 2. A swine according to claim 1 wherein the swine is a miniature swine.

1 3. A method of selecting GGTA1 null cells comprising the steps of:

2 (a) obtaining a line of cells obtained from a GGTA1 heterozygous pig or
3 fetus;

4 (b) enriching the cells for GGTA1 null cells; and

5 (c) scanning the line for viable GGTA1 null cells.

1 4. The method of claim 3 wherein in step (b), the cells are enriched by at least one
2 *treatment selected from the group consisting of:*

3 (a) treating the said cells with anti-galactose- α (1,3)-galactose antibodies, in
4 the presence of complement;

5 (b) depleting the said cells with magnetic micro-beads bound with anti-gal
6 reagents;

7 (c) treating the said cells with anti-galactose- α (1,3)-galactose antibodies and
8 depleting the said cells with magnetic micro-beads bound with anti-
9 antibodies; and

10 (d) treating the said line with gal epitope ligands and depleting the said line
11 with magnetic micro-beads bound with anti ligand antibodies.

1 5. The method of claim 3 wherein in step (b), the cells are enriched by multiple
2 *treatments selected from the group consisting of:*

- 3 (a) treating the said cells with anti-galactose- α (1,3)-galactose antibodies, in
4 the presence of complement;
- 5 (b) depleting the said cells with magnetic micro-beads bound with anti-gal
6 reagents;
- 7 (c) treating the said cells with anti-galactose- α (1,3)-galactose antibodies and
8 depleting the said cells with magnetic micro-beads bound with anti-
9 antibodies; and
- 10 (d) treating the said cells with gal epitope ligands and depleting the said line
11 with magnetic micro-beads bound with anti ligand antibodies.

1 6. The method of claim 3 wherein in step (b), the cells are enriched by three
2 treatments of each of the following:

- 3 (a) treating the said cells with anti-galactose- α (1,3)-galactose antibodies, in
4 the presence of complement;
- 5 (b) treating the said cells with gal epitope ligands and depleting the said line
6 with magnetic micro-beads bound with anti ligand antibodies.

1 7. The method according to any of claims 3-6 wherein the line of cells is a line of
2 porcine fetal fibroblast cells.

1 8. The method according to any of claims 3-6 wherein the line of cells is a clonal
2 population of porcine fetal fibroblast cells.

1 9. The method of claim 7 or 8 wherein the porcine fetal fibroblast cells originate
2 from miniature swine.

1 10. The method according to claim any of claims 3-6 wherein the line of cells is a
2 line of stem cells.

- 1 11. The method of claim 10 wherein the stem cells are primordial stem cells.
- 1 12. The method according to any of claims 4-6 wherein the anti-galactose- α (1,3)-
2 galactose antibodies are primate antibodies.
- 1 13. The method according to any of claims 4-6 wherein the anti-galactose- α (1,3)-
2 galactose antibodies are monoclonal antibodies or fragments thereof.
- 1 14. The method according to any of claims 4-5, wherein the anti-gal reagents are
2 selected from a group consisting of anti-galactose- α (1,3)-galactose antibodies
3 and lectin.
- 1 15. The method according to any of 4-6, wherein the gal epitope ligands are IB4
2 conjugates and the anti-epitope ligands are anti-IB4 conjugates.
- 1 16. The method according to claim 15 wherein the IB4 conjugates are selected from
2 a group consisting of IB4 biotin and IB4-FITC and the anti-IB4 conjugates are
3 selected from a group consisting of anti-biotin and anti-FITC.
- 1 17. A porcine GGTA1 null cell.
- 1 18. The porcine cell according to claim 17 wherein the said cell is homozygous for
2 the GGTA1 gene, and wherein the said GGTA1 gene is disrupted or rendered
3 non-functional.
- 1 19. The porcine cell according to claim 17 wherein the said cell is hemizygous for
2 the GGTA1 gene, and wherein the only single GGTA1 allele is disrupted or
3 rendered non-functional.
- 1 20. The porcine cell according to claim 17 wherein the said cell is compound
2 heterozygous for the GGTA1 gene, and wherein the said GGTA1 gene
3 comprises two different mutant alleles.
- 1 21. The porcine cell according to claim 17 wherein the said cell is from Q2.

- 1 22. The porcine cell according to claim 17 wherein the said cell is from Q9.
- 1 23. The porcine cell according to claim 17 wherein the said cell is from Q32.
- 1 24. The porcine cell according to claim 17 wherein the said cell is from Q37.
- 1 25. A porcine organ lacking expression of galactose- α (1,3)-galactose epitopes.
- 1 26. A porcine organ according to claim 26 wherein the said organ comprises cells
2 homozygous for the GGTA1 gene, and wherein the said GGTA1 gene is
3 disrupted or rendered non-functional.
- 1 27. A porcine organ according to claim 26 wherein the said organ comprises cells
2 hemizygous for the GGTA1 gene, and wherein the only single GGTA1 allele is
3 disrupted or rendered non-functional.
- 1 28. A porcine organ according to claim 26 wherein the said organ comprises cells
2 which are compound heterozygote for the GGTA1 gene, and wherein the said
3 GGTA1 gene comprises two different mutant alleles.
- 1 29. The porcine organ according to any of claims 25-28 wherein the porcine organ
2 is selected from a group comprising heart, liver, kidney, pancreas, thyroid and
3 skin.
- 1 30. Porcine tissues lacking expression of galactose- α 1,3-galactose epitopes.
- 1 31. Porcine tissues according to claim 30 wherein said tissues comprise cells
2 homozygous for the GGTA1 gene, and wherein the said GGTA1 gene is
3 disrupted or rendered non-functional.
- 1 32. Porcine tissues according to claim 30 wherein said tissues comprise cells
2 hemizygous for the GGTA1 gene, and wherein the only single GGTA1 allele is
3 disrupted or rendered non-functional.

- 1 33. Porcine tissues according to claim 30 wherein said tissues comprise cells which
2 are compound heterozygote for the GGTA1 gene, and wherein the said GGTA1
3 gene comprises two different mutant alleles.
- 1 34. A method of creating a viable GGTA1 null swine comprising selecting GGTA1
2 null cells, enucleating an oocyte, fusing the oocyte with the said GGTA1 null
3 cell to yield an NT-derived embryo, and implanting the NT-derived embryo into
4 a surrogate mother, wherein the surrogate mother has initiated estrus, but has not
5 yet completed ovulation.
- 1 35. The method according to claim 34 wherein the GGTA1 null cells are derived
2 from a line of porcine fetal fibroblast cells.
- 1 36. The method according to claim 34 wherein the GGTA1 null cells are derived
2 from a clonal population of porcine fetal fibroblast cells.
- 1 37. The method of claim 35 or 36 wherein the porcine fetal fibroblast cells originate
2 from miniature swine.
- 1 38. The method of claim 35 or 36 wherein the porcine fetal fibroblasts cells are
2 heterozygous for a GGTA1 knockout.
- 1 39. The method according to claim 34 wherein the GGTA1 null cells are derived
2 from Q2.
- 1 40. The method according to claim 34 wherein the GGTA1 null cells are derived
2 from Q9.
- 1 41. The method according to claim 34 wherein the GGTA1 null cells are derived
2 from Q32.
- 1 42. The method according to claim 34 wherein the GGTA1 null cells are derived
2 from Q37.